MSCI

TRANSCRIPT

Biodiversity Comes to Kunming and Taiwan's Semiconductors are Thirsty

Featuring:

Siping Guo, ESG Researcher, MSCI

Leslie Swynghedauw, ESG Researcher, MSCI

Bentley Kaplan

Hello, and welcome to the weekly edition of ESG Now where we will cover how the environment, our society, and corporate governance affects and are affected by our economy. I'm Bentley Kaplan, your host for this episode. And on this episode, we are going to get into two stories. First up, it's officially time for the UN conference on biological diversity, or maybe unhelpfully branded as COP15, which is being hosted in Kunming in China's Yunnan province. And although climate change has been the barnstorming environmental topic in the investment world for the last couple of years, biodiversity has been more of a marathon runner. And one that looks to be taking back some of the stage. We'll find out from Leslie Swynghedauw just what is going down in Kunming this week and what it means for companies and their investors. And after that, we'll move on to the high-tech world of semiconductors or computer chips to use the vernacular. We'll get a time to reminder from Siping Guo of how an environmental challenge can bring even one of the most advanced technologies to a standstill. Thanks for sticking around. Let's do this.

As I'm recording this and making edits into the wee hours of the morning, international delegates on the other side of the world in Kunming burning the midnight oil too. Possibly to achieve a more impactful end. And that's because it's time for the United Nation's biodiversity conference. Think of parallels to the Paris Climate Accord in 2015, and you should have an idea of why this is such a big deal. And although climate has taken up a lot of the limelight, the biodiversity crisis has not just gone away. If anything, it has only been escalating. And for Leslie's Swynghedauw, the timing of Kunming is not happening in a vacuum. She's a senior analyst in our ESG research team here at MSCI based in Frankfurt, and one of our resident experts in biodiversity in some ways for her, this is long overdue.

Leslie Swynghedauw

So for the past two to three years, the subject has really gone from being seen as a tree hugger topic to something that now everyone wants to talk about. Biodiversity is seen by many investors as the next big ESG trend, and indeed the water economic forum as evaluated that more than half of our global GDP is dependent on nature. The other thing that we're seeing from the investment community is also that they're starting to realize that climate change cannot be solved independently from nature. Biodiversity loss, as we know is a major contributor to climate change, but in the same way, biodiversity conservation is also a very powerful tool to fight global warming. So there are a lot of expectations, as you can imagine on COP15, because previously also a lot of the biodiversity targets agreed as through multinational treaties are at regional level, have not been met. But many elements can make us helpful.

If you look at the initial draft on the COP15, you can see that the targets that they drafted are more outcome-oriented, they're time-bound and quantifiable. You have notably the flagship target to protect

30% of land, fresh water and oceans by 2030, but you also have more specific ones that address key drivers of space disappearance such as healthy nutrition lost, reducing pesticide use by two thirds and fully eliminating plastic waste discharges by 2030.

Bentley Kaplan

So exactly what happens in Kunming this week, and the second phase of the conference in May 2022 could be decisive for the future of biodiversity and everything it underpins, but COP15 is not the first flag in the ground. It's more like one step in a multi-pronged approach to tackle by diversity loss and working in a company that builds investment tools and provides research to asset owners and asset manager clients, Leslie has seen firsthand where some of these changes have been happening the

Leslie Swynghedauw

I would say that disparity-vested momentum is particularly acute in Europe. Most of our plans demands are coming from there when it comes to biodiversity and particularly from strict countries, France, the UK and the Netherlands. And this is not at all surprising when you transpose this regional map to where the most stringent biodiversity regulations I imagine. The EU biodiversity strategy is probably the most ambitious policy out there. And it's also in Europe that we are seeing as some of the first regulation incentivizing the financial institutions to reallocate capsules towards biodiversity efforts. Many other are countries or regions in the world could follow suit, especially when you look at the success of the latest plate for nature, which has now been under spec more than 90 head of states. It's huge. They have all committed to reverse biodiversity loss by 2030, which is also a very ambitious target. And I think the recent nature compact made by the G7 countries is also a really good illustration on how worldwide that momentum could become.

Bentley Kaplan

So this was cut from a long interview and Leslie did take me through some great detail on national and multinational treaties and laws that have addressed by diversity, including article 29 in France, which makes it compulsory for financial institutions to disclose their biodiversity related risks, how they plan to reduce their impact and how that aligns with international laws or treaties. Much like the one being thrashed out in Kunming. But all throughout our conversation, Leslie's taken a very measured tone. And that's because there is a lot at stake. This is not the first time that a multinational buddy has tried to do something about biodiversity. It's just that the past track record leaves a much to be desired, but that doesn't mean there isn't room to hope because in many ways, whatever happens or doesn't happen at Kunming the regulatory efforts elsewhere, look to inevitably be the needle on biodiversity protection. And as that shift happens, the questions that investors might be asking is, "Which companies or industries are going to fall into the firing line first?" Who are the bad boys and girls of biodiversity?

Leslie Swynghedauw

The scientific assessment is quite clear on that. They have clearly identified the food prediction system as being the main cause of biodiversity loss. If you look at agricultural activities, they are currently responsible for 80% of natural land conversions. Just to give you an idea, cattle ranching, soy and palm oil production alone are driving 60% of tropical deforestation. And this industry is also one of the hungriest for natural resources. It requires more than 70% of the hearse, fresh water sources and it over fishes a third of all the fish stocks that are currently available. We also know that pollution and climate change a significant drivers of biodiversity loss and well, here again, the food industry is nurturing great performance. It emits over a quarter of global greenhouse gas emissions. It is a

significant contributor of air and water pollutants through its intensive use of pesticides and fertilizers. And it's also the largest users of plastic, which is the most abundant component of marine litter.

Bentley Kaplan

So if this was some type of biodiversity, end times poker game, food producers would have a Royal flush. Plastic waste. Pollution, greenhouse gas emissions, conversion of natural land, water consumption, you name it and food production does it. So the next logical question and the one I put to Leslie was, okay, well, the food producers are this impactful, then how ready are they for whatever regulatory bombardment is going to be coming their way through any number of new biodiversity agreements or investment mandates?

Leslie Swynghedauw

I think as of today on the assert of food companies in the MSCI Acquia Investible Market Index add implemented programs with the agricultural suppliers to, is to reduce their carbon emissions or the use of fresh water and the chemical input that they use. Also on the marginal fraction of food companies are committed to cap the use of virgin plastic within the packaging. Another thing to look at is the actual product portfolio of food companies. Not all food products are equals , in terms of diversity impact and lifestyle is by far the most bio-diversity intensive food item. And we also know that we consume where too much animal pertains for what our daily intake requires. And also far for what is recommended by house regulatory bodies. If you look at the industry, it has been quite slow to shift towards plant-based proteins and Q2 meat that have a much lower biodiversity footprint than there are animal proteins counterparts.

Leslie Swynghedauw

So as I said, this is an assessment at industry level. You also have notable progress to note and especially great steps that have been undertaken by a handful of good players. We've seen the level of comprehensiveness of gas, emissions reduction targets going up. Certain actions have also shown very interesting progress in terms of transparency and then seeing the traceability to the plantation and farm level, which is really key and from them and also for those companies to properly identify where the biodiversity hotspots are and plan then adequately the biodiversity protection and restoration measures that that specific local context request.

Bentley Kaplan

So for the food industry, it seems that the only way to go is up. And the bit like climate change, efforts to conserve biodiversity are not going to be achieved by the good intentions of companies alone. The challenge of better conserving biodiversity and the ecosystem services that we through it, is considerable. As Leslie pointed out, biodiversity is not something that happens out there away from companies and away from the economy. Food production, ironically enough, depends on the very biodiversity that it is destroying, but unlike fossil fuels shifting into renewable energy and food production is not something that can easily be pivoted away. So how quickly and how effectively these food producers improve their practices may come down to the actions of governments and investors. Governments may start taking a harder look at subsidies for food production and attaching more strings to them or revoking them altogether. And as investors look harder and harder at their portfolios, it might open up opportunities for engagement or better aligning with those companies that have taken their first steps to more sustainable practices.

Bentley Kaplan

As our next story will show environmental challenges are starting to blow back more often and in sometimes unexpected places. In one of those unexpected places is the world of semiconductors. Working from the basic property of being able to both conduct and insulate signals, semiconductors have become in many ways, the interstitial tissue of our modern world. From a smart device or computer that you're listening to this episode on, the hard way of powering the data center, sitting behind our servers, to the fridge that your breakfast came from, or the way a COVID-19 vaccine is registered, or even the rice cooker that anchored your dinner last night, semiconductors or chips, power them all. Which is why it's a real bummer when there's a global chip shortage. One that has been grinding on since mid 2020 and looks to have a healthy head of steam well into 2022. To find out just how much of a bummer it is, I asked Siping Guo out of MSCI Beijing office to break down exactly how the supply demand dynamic got so out of whack

Siping Guo

On the demand side, ventilators, remote healthcare work at home and virtual learning. The grows of these sectors are really driving the demand of chips right after the outbreak of the pandemic. And when the economy slowly recovered from the pandemic, the demand of cars, home, electronic appliances, industrial robotics, telecommunication equipments really ramped up very fast. On the supply site, some of the countries or regions where a major chip production basis are located, actually went into lockdown in early 2020. They may need to shut down their factories from time to time, according to some local restrictions due to the pandemic. And these all very significantly interrupted the semiconductor supply. In general, the semiconductor industry is not very good at responding to the sudden kind of swings of demands, because normally the production cycle of semiconductor may take a couple of months and it also relies on seamless collaborations across the value chain.

Bentley Kaplan

It really is a nod to the success of semiconductors that demand increased both going into lockdown and coming out of it. And fair play to semiconductors. There were a bunch of other industries that got caught out by the global pandemic and couldn't turn the ship around quickly enough. Well, even just squeeze the ship through the Suez canal, but it's worth looking a little deeper into how semiconductors are put together, because in their laser floor that may be exposed even well after the pandemic has ended. Now, I'm going to paraphrase from a recent paper that Siping authored to make things a bit easier.

Semiconductor manufacturing is a pretty specialized game. They get made basically through two approaches. One is by companies that do it all. Right from the initial chip design, all the way through to assembling and testing. We can refer to these as Integrated Device Manufacturers or IDMs. And TBH being an IDM is a hard ask. It's a lot of complex processes to run under one company's metaphorical roof. And the second way of making chips is to split up all these complex processes to divide and conquer. With each major step along the way, being taken up by a separate company. At the very beginning are the chip designers that dream up some fancy plans, they then give these plans to contract manufacturers, which are basically separate Foundry companies and outsourced assembly and test companies or OSATs. And these companies are the ones that actually roll up their sleeves and do the hard work of making and testing these chips. The second approach to making chips is called the Fabless Foundry Model. Fabless for the design companies that don't do any fabricating and Foundry of all the actual assembly and testing that comes after the design. And although the Fabless Foundry Model allows companies to focus on just one thing and get very good at what they do and

maximize the overall capacity of the semiconductor value chain, it has had some unexpected side effects.

Siping Guo

From an ESG perspective, we can see that water consumption is actually outsourced from those Fabless chip makers to the contract manufacturers. And that leads to Fabless companies. They have really low level of water reliance, but at the same time contract manufacturers, they may have a huge reminder for water consumption and withdrawal. We also found that the kind of specialization along the semiconductor value chain is often accompanied by geographic concentration. Taiwanese chip makers-they're really dominating in the Foundry market and also the specialized packaging and assembly markets that lead to the most water-intensive processes, highly concentrated in one single markets, Taiwan. And Taiwan is known for its water stress and also prone to drought. So that leaves very huge risks for the whole supply chain.

Bentley Kaplan

Right. So while the semiconductor value chain was busy, splitting itself up and specializing, what actually ended up happening was that a sizable chunk of the most water-intensive processes ended up in places where water was not plentiful. Take the Foundry companies. Within MSCIs Acquia universe, 57% of all Foundry operations were based in highly water stressed regions. Which makes sense because about 56% of all Foundry assets were based in Taiwan, which also accounted for 98% of revenue generated from Foundry operations. And Taiwan gets a lot of rain. The problem is that a lot of Taiwan is complex mountainous terrain. So it's difficult to direct and store this rainfall, especially when a lot of it falls close together during the monsoon season. And Taiwan's chip makers have done a pretty good job of adapting to this risk. In our water stress key issue. Siping found that Taiwanese chip makers had the best risk management scores compared with chip makers from other countries, particularly because of things like water recycling and monitoring and oversight of these efforts by company executives. But this may not be enough. Because as chips get more sophisticated, so the need for water actually goes up. And ever the party pooper to watch dependent businesses, climate change is probably just going to make things more challenging and unpredictable.

Siping Guo

So for chip makers in time one, we haven't seen any report of their production being affected by the droughts, but we do see chip makers, they were forced to reduce water use by around 15% to 17%, but that hasn't really hit the balance sheet yet. But we want to raise one concern here that these kind of resilience during the droughts was coming at a cost of cutting nearly 30% of the municipal water supplies in some of the densely populated cities in Taiwan. And it also resulted a stopping of irrigation of nearly one fifth of the irrigated farmland in Taiwan. That reminds about social discontent from household farmers and small businesses. Seeing their water usage limited may turn out to be a risk for chip makers to operate sustainably in the future in Taiwan.

Bentley Kaplan

So the semiconductor industry is doing its very best to drag us further into the modern world. Taiwanese Foundry companies have squared off against water scarcity for some time. And there may be further innovation to come that sees these companies doing more with less. But as demand for chips, more sophisticated chips goes up and water availability starts to drop. These Foundry companies will start feeling the hard edges that lie underneath our economy.

The bare bones that make much of our modern life possible. When you hear the phrase water wars, you're probably not immediately thinking of Taiwan's chip makers squaring off against its farmers and small businesses. But increasingly we're seeing clear signs of how things like water are threaded through our complex supply chains and businesses. And that pulling on that thread can create massive and unexpected disruptions and not too far from Taiwan, in Kunming, delegates are trying to tie together a new framework to better protect the natural resources and biodiversity that underpins all the other bits of our economy and well, life on earth. And unlike Taiwan's chip makers, food producers have not really been pushed to make more with less. But that time might be fast running out and failing to adapt and adapt quickly might find both food companies and their investors under increasing regulatory pressure. The days of dining and dashing looked to be ending soon.

And that is it for the week. A massive thanks to Leslie and Siping for their take on the news with an ESG twist. Siping has published a paper on a semiconductor research called 'Thirsty Chip Makers Face Taiwan's Worst Drought in Decades'. It's currently only available to our clients, but there may be other more public versions of the research coming out, further down the line. And as for Leslie, she'll be popping up all over the place to talk and write about biodiversity and the finance industry. So do keep an eye out for her. In the meantime, thank you very much for tuning in. Don't forget to rate and review the show wherever you're listening to us. All and any feedback is really great. It helps us to get better at what we do and to get you what you really want to hear. Thanks again. Stay safe out there and we'll catch you again next week.

The MSCI ESG Research Podcast is provided by MSCI Inc Subsidiary MSCI, ESG Research, LLC, a registered investment advisor and the Investment Advisors Act of 1940. And this recording and data mentioned here-in has not been submitted to nor received approval from the United States Securities and Exchange Commission or any other regulatory body. The analysis discussed should not be taken as an indication or guarantee of any future performance, analysis, forecast or prediction. The information contained in this recording is not for reproduction in whole or in part without prior written permission from MSCI ESG Research. None of the discussion or analysis put forth on this recording constitutes an offer to buy or sell or promotional recommendation of any security, financial instrument or product or trading strategy. Further, none of the information is intended to constitute investment advice or recommendation to make or refrain from making any kind of investment decision and may not be relied on as such. The information provided here is as is. And the use of the information assumes the entire risk of any use it may make or permit to be made of the information. Thank you.

MSCI

TRANSCRIPT

About MSCI

MSCI is a leading provider of critical decision support tools and services for the global investment community. With over 50 years of expertise in research, data and technology, we power better investment decisions by enabling clients to understand and analyze key drivers of risk and return and confidently build more effective portfolios. We create industry-leading research-enhanced solutions that clients use to gain insight into and improve transparency across the investment process. To learn more, please visit **www.msci.com**.

This document and all of the information contained in it, including without limitation all text, data, graphs, charts (collectively, the "Information") is the property of MSCI Inc. or its subsidiaries (collectively, "MSCI"), or MSCI's licensors, direct or indirect suppliers or any third party involved in making or compiling any Information (collectively, with MSCI, the "Information Providers") and is provided for informational purposes only. The Information may not be modified, reverse-engineered, reproduced or redisseminated in whole or in part without prior written permission from MSCI.

The Information may not be used to create derivative works or to verify or correct other data or information. For example (but without limitation), the Information may not be used to create indexes, databases, risk models, analytics, software, or in connection with the issuing, offering, sponsoring, managing or marketing of any securities, portfolios, financial products or other investment vehicles utilizing or based on, linked to, tracking or otherwise derived from the Information or any other MSCI data, information, products or services.

The user of the Information assumes the entire risk of any use it may make or permit to be made of the Information. NONE OF THE INFORMATION PROVIDERS MAKES ANY EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION (OR THE RESULTS TO BE OBTAINED BY THE USE THEREOF), AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, EACH INFORMATION PROVIDER EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES (INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF ORIGINALITY, ACCURACY, TIMELINESS, NON-INFRINGEMENT, COMPLETENESS, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY OF THE INFORMATION.

Without limiting any of the foregoing and to the maximum extent permitted by applicable law, in no event shall any Information Provider have any liability regarding any of the Information for any direct, indirect, special, punitive, consequential (including lost profits) or any other damages even if notified of the possibility of such damages. The foregoing shall not exclude or limit any liability that may not by applicable law be excluded or limited, including without limitation (as applicable), any liability for death or personal injury to the extent that such injury results from the negligence or willful default of itself, its servants, agents or sub-contractors.

Information containing any historical information, data or analysis should not be taken as an indication or guarantee of any future performance, analysis, forecast or prediction. Past performance does not guarantee future results.

The Information should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. All Information is impersonal and not tailored to the needs of any person, entity or group of persons.

None of the Information constitutes an offer to sell (or a solicitation of an offer to buy), any security, financial product or other investment vehicle or any trading strategy.

It is not possible to invest directly in an index. Exposure to an asset class or trading strategy or other category represented by an index is only available through third party investable instruments (if any) based on that index. MSCI does not issue, sponsor, endorse, market, offer, review or otherwise express any opinion regarding any fund, ETF, derivative or other security, investment, financial product or trading strategy that is based on, linked to or seeks to provide an investment return related to the performance of any MSCI index (collectively, "Index Linked Investments"). MSCI makes no assurance that any Index Linked Investments will accurately track index performance or provide positive investment returns. MSCI Inc. is not an investment adviser or fiduciary and MSCI makes no representation regarding the advisability of investing in any Index Linked Investments.

Index returns do not represent the results of actual trading of investible assets/securities. MSCI maintains and calculates indexes, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the index or Index Linked Investments. The imposition of these fees and charges would cause the performance of an Index Linked Investment to be different than the MSCI index performance.

The Information may contain back tested data. Back-tested performance is not actual performance, but is hypothetical. There are frequently material differences between back tested performance results and actual results subsequently achieved by any investment strategy.

Constituents of MSCI equity indexes are listed companies, which are included in or excluded from the indexes according to the application of the relevant index methodologies. Accordingly, constituents in MSCI equity indexes may include MSCI Inc., clients of MSCI or suppliers to MSCI. Inclusion of a security within an MSCI index is not a recommendation by MSCI to buy, sell, or hold such security, nor is it considered to be investment advice.

Data and information produced by various affiliates of MSCI Inc., including MSCI ESG Research LLC and Barra LLC, may be used in calculating certain MSCI indexes. More information can be found in the relevant index methodologies on www.msci.com.

MSCI receives compensation in connection with licensing its indexes to third parties. MSCI Inc.'s revenue includes fees based on assets in Index Linked Investments. Information can be found in MSCI Inc.'s company filings on the Investor Relations section of www.msci.com.

MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc. Except with respect to any applicable products or services from MSCI ESG Research, neither MSCI nor any of its products or services recommends, endorses, approves or otherwise expresses any opinion regarding any issuer, securities, financial products or instruments or trading strategies and MSCI's products or services are not intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such. Issuers mentioned or included in any MSCI ESG Research materials may include MSCI Inc., clients of MSCI or suppliers to MSCI, and may also purchase research or other products or services from MSCI ESG Research. MSCI ESG Research materials, including materials utilized in any MSCI ESG Indexes or other products, have not been submitted to, nor received approval from, the United States Securities and Exchange Commission or any other regulatory body.

Any use of or access to products, services or information of MSCI requires a license from MSCI. MSCI, Barra, RiskMetrics, IPD and other MSCI brands and product names are the trademarks, service marks, or registered trademarks of MSCI or its subsidiaries in the United States and other jurisdictions. The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and Standard & Poor's. "Global Industry Classification Standard (GICS)" is a service mark of MSCI and Standard & Poor's.

MIFID2/MIFIR notice: MSCI ESG Research LLC does not distribute or act as an intermediary for financial instruments or structured deposits, nor does it deal on its own account, provide execution services for others or manage client accounts. No MSCI ESG Research product or service supports, promotes or is intended to support or promote any such activity. MSCI ESG Research is an independent provider of ESG data, reports and ratings based on published methodologies and available to clients on a subscription basis. We do not provide custom or one-off ratings or recommendations of securities or other financial instruments upon request.

Privacy notice: For information about how MSCI ESG Research LLC collects and uses personal data concerning officers and directors, please refer to our Privacy Notice at https://www.msci.com/privacy-pledge.